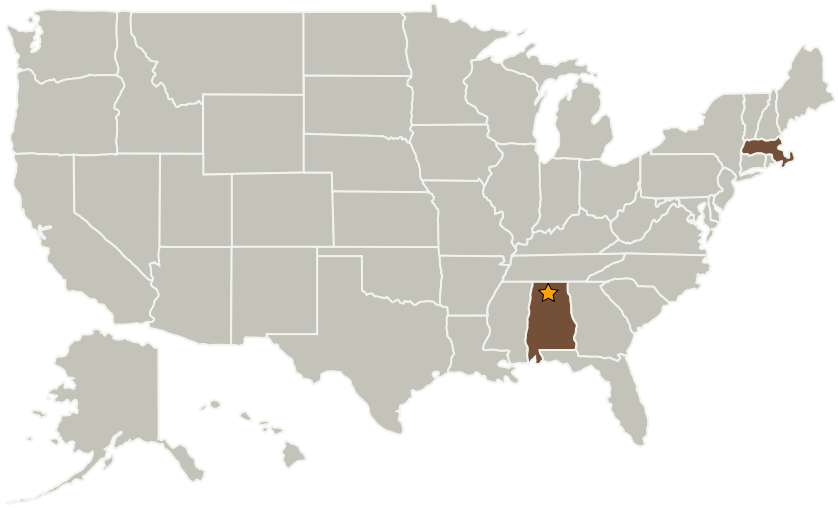
High-Pressure Oxygen Concentrator, Phase II

Completed Technology Project (2008 - 2010)

Project Introduction

NASA desires to generate and store gases including oxygen and nitrogen at sub-critical conditions as a part of its lunar and spacecraft atmospheric systems. Oxygen at pressures up to 3000 psia is particularly desired for refilling storage tanks for lunar and in-flight applications including recharging high-pressure gas bottles for EVA/EMU, lunar rovers and surface hoppers. To address these needs, Reactive Innovations, LLC proposes to continue developing and delivering a compact high-pressure oxygen concentrator that can take low-pressure atmospheric gas and generate a separate stream of high-pressure pure oxygen. During a Phase I program, we applied our high-pressure reactor hardware to separate and compress oxygen from ambient pressure air and oxygen streams in both dry and saturated conditions. We used this information to develop a predictive performance model for the oxygen concentrator to aid in a conceptual design and to allow NASA mission planners to conduct trade studies on metrics including the generated oxygen rate per compressor mass and power requirements. For the Phase II program, we will produce operational prototype electrochemical concentrators that produce 3000 psia oxygen from ambient pressure sources of air or oxygen. These concentrators will be sized to produce 2 kg of oxygen at 3000 psia within a 24 hour time period. By the end of the Phase II effort, this concentrator will be at a Technology Readiness Level of 4-5.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Marshall Space Flight Center (MSFC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Marshall Space Flight Center(MSFC)	Lead Organization	NASA Center	Huntsville, Alabama
Reactive Innovations, LLC	Supporting Organization	Industry	Westford, Massachusetts

Primary U.S. Work Locations	
Alabama	Massachusetts

Project Transitions

December 2008: Project Start

December 2010: Closed out

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX07 Exploration Destination Systems
  - TX07.1 In-Situ Resource Utilization
    - TX07.1.3 Resource Processing for Production of Mission Consumables